

REMARKS

Claim 14 is rejected under 35 USC §112, Claims 1-5, 7-12 and 14-17 are rejected under 35 USC §102 and Claims 1-17 are rejected under 35 USC §103. The applicants respectfully traverse these rejections and request reconsideration of the application in view of the above amendments and the following remarks.

Claim 14 has been amended. This change does not constitute new matter since this clarification of the claims is supported by the original disclosure.

Claim 14 was rejected under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. Specifically, the Office Action suggests that in Claim 1 the use of the term "Cyclar-type" is the improper use of a trademark or trade name to identify any particular material or product.

Claim 14 has been amended and now reads in part "wherein the process is a dehydrocyclodimerization process of a C₃ alkane to benzene, toluene and xylenes ". Support for this language is found on page 2, lines 1-8; page 9, line 21, through page 10, line 7, and the Abstract. This change in language has been made to Claim 14 to clarify the claimed subject matter without intending to narrow the scope of the claims.

Claims 1-5, 7-12 and 14-17 were rejected under 35 USC §102(b) as being anticipated by U. S. Patent no. 4,891,463 to Chu ("Chu"). Specifically, the Office Action suggests that Chu discloses a process of aromatization of a paraffin, such as ethane and propane, to benzene, toluene,

C8 aromatics, methane and ethane in the presence of a catalyst containing a ZSM-5 zeolite, the aluminum of which is substituted with gallium, a metal such as platinum, and a binder such as alumina and silica.

Chu discloses a ZSM-5 zeolite, the aluminum of which is substituted with gallium. The ZSM-5 zeolite of the present invention need not have the aluminum substituted with gallium. Chu discloses an added metal which may be deposited on the surface of the zeolite by conventional ion-exchange or impregnation techniques (col. 3, lines 45-49). The added metal may be Groups I through VIII of the Periodic Table. Groups I through VIII of the Periodic Table contain about eighty elements of which platinum is one. Chu discloses examples of the added metal as zinc, platinum, rhenium, cobalt, titanium, tellurium, sodium, nickel, boron, chromium, vanadium, copper, palladium, calcium, and rare earth metals. There are twenty-nine examples of the added metal disclosed of which platinum is one. To obtain the elements of the claimed invention, a person of ordinary skill in the art must select platinum from a group of over eighty or from a group of twenty-nine.

The catalyst composition of the claimed invention, Pt/ZSM-5, i.e., platinum deposited on ZSM-5, is not specifically disclosed in Chu. When portions of teachings within a reference are selected and combined to arrive at a specific composition, anticipation can only be found if the classes of substituents are sufficiently limited or well delineated. The applicants contend that one element out of over eighty or, at best, twenty-nine possibilities is not a case where the classes of substituents are sufficiently limited or well delineated.

The necessary degree of precision with respect to the specific catalyst composition is not present in the cited reference. There is no disclosure in the cited reference which clearly and unequivocally directs those skilled in the art to make the selection of platinum. Indeed, Chu discloses a preference for the added metal being gallium (col., 5, lines 13-15: "Of the total amount of added metal, gallium may comprise an amount from over 50 to 100 wt.%"; Claim 2: "The process of claim 1 wherein said added metal consists solely of gallium.").

It is established case law that a reference publication must contain within itself a sufficient description to enable a person having ordinary skill in the art to make the invention without an unreasonable amount of experimentation.

If the earlier disclosure offers no more than a starting point for further experiments, if its teaching will sometimes succeed and sometimes fail if it does not inform the art without more how to practice the new invention, it has not correspondingly enriched the store of common knowledge and it is not an anticipation.

Dewey & Almy Chem. Co. v. Mimex Co., 124 F2d 986, 52

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The applicants argue that the examiner's reliance on Chu for platinum metal deposited on ZSM-5 is misplaced and not in accord with the requirements of 35 USC §102(b).

While the applicants recognize that demonstration of unexpected results is not relevant to a rejection based on anticipation, the applicants respectfully direct the examiner's attention to the Affidavit under 37 CFR §1.132 filed concurrently with this paper in which examples of a Ga-ZSM-5 catalyst and a Pt/Ga-ZSM-5 catalyst were compared in a process for aromatization of ethane to

illustrate that platinum is not equivalent to gallium as a added metal as disclosed by Chu. Example 1 for Pt/Ga-ZSM-5 and Comparative Example 1 for Ga-ZSM-5 show methane production is suppressed in favor of producing more ethane relative to methane so that selectivity to ethane in the fuel gas is increased and selectivity to aromatic products, i.e., benzene, toluene and xylene, is increased.

Claims 1-5 and 7-17 were rejected under 35 USC 103(a) as being obvious over Chu. Specifically, the Office Action suggests that Chu discloses a process of aromatization of a paraffin, such as ethane and propane, to benzene, toluene, C8 aromatics, methane and ethane in the presence of a catalyst containing a ZSM-5 zeolite, the aluminum of which is substituted with gallium, a metal such as platinum, and a binder such as alumina and silica. The Office Action further suggests that the zeolite of Claim 13 is well-known.

Claim 6 was rejected under 35 USC 103(a) as being obvious over Chu in view of U.S. Patent no. 6,160,191 to Smith et al ("Smith"). The Office Action suggests that Smith discloses an aromatization catalyst of which the silicon can be substituted with germanium.

Every limitation in the claims must be given effect rather than considering one in isolation from the others [In re Geerdes, 491 F2d 1260, 180 USPQ 789(CCPA 1974)]. The patentable difference of the present invention over the reference is that the catalyst of the claimed invention is a ZSM-5 on which platinum has been deposited.

MPEP §2142 requires some suggestion or motivation to modify the reference. Such suggestion or motivation for ZSM-5 on which platinum been deposited did not exist. Chu, neither alone or in combination with Smith, does not provide a suggestion or motivation to select platinum

over the other approximately eighty elements of Groups I through VIII of the Periodic Table or over the other twenty-nine elements of the disclosed added metals. MPEP§2142 also requires a reasonable expectation of success. While it may have been obvious-to-try a process for the aromatization of hydrocarbons using ZSM-5 on which platinum has been deposited, obvious-to-try is not equivalent to a reasonable expectation of success. Further, according to MPEP§2142, the prior art reference must teach or suggest all the claim limitations. The cited references do not teach or suggest using ZSM-5 on which platinum has been deposited for a process for the aromatization of hydrocarbons.

Even if a prima facie case of obviousness were established by the cited reference, the unexpected results of the claimed invention would satisfy the requirements of patentability. As shown in the attached Affidavit under 37 CFR §1.132, in a process for aromatization of alkanes zeolite catalysts were compared. One was a catalyst of the claimed invention, a ZSM-5 on which platinum had been deposited (Examples 1 and 2). Another was a catalyst as in Chu, a gallium-ZSM-5 on which no metal had been deposited (Comparative Example 1). Additional examples of catalyst of the claimed invention, a gallium-ZSM-5 on which platinum had been deposited (Example 3) and a germanium-ZSM-5 on which platinum had been deposited (Example 4) were also evaluated. The results shown in the Affidavit for Examples 1, 2, 3 and 4 demonstrate the improvements and unexpected results of the claimed invention and distinguish the claimed invention from Chu alone or in combination with Smith. In a process for aromatization of alkanes a catalyst of a ZSM-5 on which platinum had been deposited has better performance in selectivity to ethane in the fuel gas and selectivity to aromatic products, i.e., benzene, toluene and xylene, than

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that for a catalyst of a gallium-ZSM-5 on which platinum has not been deposited.

A Petition and Fee for Extension of Time under 37 CFR §1.136(a) is being filed concurrently with this paper. The Commissioner is hereby authorized to charge the fee of \$120.00 under 37 CFR §1.17(a)(1) and any additional fees due by filing this paper or to credit any overpayment to Account No. 502025.

On the basis of the above amendments and remarks, reconsideration of this application is requested and its allowance of the claims is requested at the examiner's earliest convenience. No new matter has been added.

Respectfully submitted,



Jim Wheelington
Reg. No. 33,051

SABIC Americas, Inc.
SABIC Technology Center
1600 Industrial Blvd.
Sugar Land, Texas 77478
(281) 207-5719
Customer No. 30691